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Fuqua's Decision Appalls Associates

House Space Chairman to Fill Industry Post

Barely concealed revulsion is evident around the House Science and Technology Committee while Chairman Don Fuqua (D-Fla.) serves out the final 6 months of his long Congressional career before going directly to a plush job as chief lobbyist for the aerospace industry. "It's very awkward," one of Fuqua's close associates told SGR, noting that next month, Fuqua will chair the first major Congressional hearing on the Challenger disaster.

In January, upon completion of his 12th term in the House, Fuqua will become President and General Manager of the Aerospace Industries Association (AIA) at a salary rumored to be around $200,000 a year. The AIA, with a staff of about 70 headquartered in downtown Washington, represents every major manufacturer in aviation, space, missiles, and related high-tech enterprises, including Morton-Thiokol, manufacturer of the faulty booster on the Challenger. Among the other members are Boeing, General Electric, General Dynamics, Grumman, Hughes, IBM, Northrop, Rockwell, and TRW.

Fuqua's job choice and insistence on retaining the chairmanship might ordinarily have passed without notice as just another case of a public servant going for the gold. But the brazen lobbying antics of Reagan crony Michael Deaver have sensitized even the calloused capital to the seaminess of these transitions. Senator Donald W. Riegle Jr. (D-Mich.) greeted the news of Fuqua's coming move by describing

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Japan Offers $5 Billion Fund For World Environment R&D

Administration officials are skeptically pondering an apparently serious Japanese government offer to put up $5 billion in seed money for a 20-year worldwide research program focused on environmental problems and spilling over to large areas of the basic life sciences. Japan says it will provide "all the funds necessary for the initial stage" of the program and "the major portion" of later stages for "large-scale international research and development projects aimed at producing helpful contributions to human society."

Titled the "Human Frontier Program," the proposal is darkly viewed in Washington as harboring "a hidden agenda" for tapping into advanced American and Western European research, particularly in biotechnology, according to White House and State Department officials who have been looking into it. They note that the proposal comes from Japan's Ministry of International Trade and Industry, the famed and feared MITI that has quarterbacked Japan's fabulous export successes. The program was first brought to US attention in March when a MITI official discussed it in Washington with the Acting Director of the White House Science Office, John P. McTague.

Japanese officials in Washington tell SGR that the program originated as a pet scheme of Prime Minister Nakasone, and that it comes from MITI in tandem with

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In Brief

Of the 59 members elected to the National Academy of Sciences this year, 3 are women, bringing the number of women currently in the NAS to 51, out of a total membership of 1477. According to the NAS, 60 women have been elected since NAS's founding in 1863. The explanation offered for this appalling gender disparity is that election is purely on the basis of scientific achievement, as judged by the previously elected.

The hardline side of the Pentagon remains steadfast against allowing Soviet-bloc students and researchers access to campus-based supercomputers. NSF Counsel Charles Herz told the DoD-University Forum May 5 that very few such foreigners would seek to use the machines and those who do could not engage in mischief without getting caught. Apparently sympathizing with the NSF position, DoD Under Secretary Donald A. Hicks wisecracked that the spies in the US are Americans, not Russians. Hicks asked for more data on potential Soviet-bloc use. Stanford President Donald Kennedy, co-chairing the Forum with Hicks, chimed in that universities are poor policemen. "They're flaccid, sloppy, disorganized places," said Kennedy.

When George A. Keyworth II quit as White House Science Adviser last November, it was to go into the consulting business with Herbert Meyer, a former CIA official. In January, they set up shop as Keyworth-Meyer International. Now there's been a split, and Keyworth is doing business as The Keyworth Company.

. . . Fuqua Denies Any Conflict of Interest

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the House Science and Technology Committee as a "special-interest committee" that has been "very damaging to the country and damaging to the space program." And he suggested that Fuqua is "another example of the revolving-door problem."

The S&T Committee, which Fuqua has chaired since 1979, writes the legislative framework for the now-$7 billion NASA budget and holds oversight authority over space activities. The Committee is widely regarded on Capitol Hill as a patsy for the space industry and the NASA bureaucracy. The Committee also has legislative jurisdiction over the National Science Foundation and general scientific affairs, a role in which Fuqua has become a favored legislator of the mandarins of academic science simply by giving them everything they ask for. They commonly refer to him as a "statesman." If past performance is a guide, the National Science Board, NSF's board of directors, is sure to give him a medal after he leaves Congress.

Several of Fuqua's associates have suggested to him that he step down from the chairmanship during these final months of his Congressional career. But Fuqua adamantly insists on serving out his term as Chairman and denies that there's an inevitable conflict of interest between the chairmanship and his forthcoming employment.

In response to an inquiry about the conflict-of-interest concerns, Fuqua told SGR last week, "I don't anticipate any conflicts. If there is a problem with any of the [aerospace] contractors, I'll step aside." He added, "I've asked the General Counsel of the Committee to keep a watch on it."

Fuqua's attitude is not widely shared, but, with one exception, dismay over his obtuseness has been confined to private conversations. The exception—which quickly circulated around the Capitol Hill grapevine—occurred on April 30 while the Senate Commerce, Science, and Transportation Committee was in executive session to discuss the nomination of James Fletcher as Administrator of NASA.

Senator Riegle, a member of the House for a decade before his election to the Senate in 1976, criticized the quality of Congressional oversight on NASA and said, "I think the House space committee [as Fuqua's S&T Committee is often referred to] is a special-interest committee, I think that is very obvious, and I think that it's very damaging to the country and damaging to the space program." Riegle questioned the propriety of Senator Jake Garn (R-Utah) and Rep. Bill Nelson (D-Fla.) riding the shuttle, charging that it produced "entangled relationships" between NASA and its supposed overseers.

The Senator then cited a snide *Washington Post* political-gossip article on Fuqua's coming job change, in which it was stated that "The revolving door spins for Congressmen as well as high-ranking Administration officials." The *Post* article referred to the Aerospace Industries Association as having "done its best to explain . . . why spare parts cost so much."

Riegle stated: "I notice that one of our colleagues in the House, who is retiring, Congressman Fuqua, who is the Chairman of the House Science and Technology Committee, and who is obviously a hardworking House member, and has the confidence of the people of his district for many years. Nevertheless, the Chairman of that oversight committee in the House is leaving the House at the end of this year and will be joining the AIA, which is the Washington-based trade association representing the nation's space and defense manufacturers. And [the *Post* article] relates this to the revolving-door problem, that we are seeing a lot of in agencies of government, certainly the Defense Department, but here as well."

If Fuqua is registering the distaste that's been generated by his career move, he's not showing it. Nor has he offered any explanation of why he didn't wait out a discreet interval before moving from Congress to the hardsell lobby of an industry that receives billions of dollars in contracts from a government agency under the jurisdiction of his Committee.

The AIA is one of the oldest industrial lobbies on the Washington scene, having started out in 1918 as the Aeronautical Chamber of Commerce. As for the pay he'll receive, Fuqua wouldn't comment on reports of $200,000, beyond remarking to SGR, "Let's say, it's more than my Congressional salary."

Fuqua will succeed Karl G. Harr Jr., who has headed the AIA for 23 years.—DGS

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. . . Japan Proposes International Management

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the Japanese Science and Technology Agency. They explain that it is intended, among other things, to respond to the old charge that Japan uses a lot of western-produced basic research but produces little of its own.

In any case, the Human Frontier Program was discussed at several preparatory meetings for last month's Tokyo economic summit, and Nakasone reportedly hoped to discuss it there with the other heads of state. However, with the agenda suddenly revised to make room for discussions of terrorism, the research program got left out.

With a downturn in Nakasone's political fortunes reducing the odds that he'll continue in office after next October, the status of the program is uncertain. But US officials say it's still alive and that they plan to explore it in detail with the Japanese. Gramm-Rudman pressures have vivified Washington's interest in foreign cost-sharing of America's research ambitions.

As outlined in a paper given to SGR by the Japanese Embassy in Washington, the Human Frontier Program sounds like a relic from the Carter era of environmental anguish and energy anxiety, and is thus far out of harmony with the Reagan doctrine of personal greed and mega-technologies as the elixirs of societal woes. To do business with the Reagan crowd, the Japanese will have to come around.

The outline of the program states that "though our lives have become richer, we now find ourselves faced with . . . a global increase in burdens on the environment. A depletion of useful resources. An explosive increase in energy consumption. Strained relations between technology and mankind (alienation of man; accidents occurring on a large scale). An aging society and an expanding population."

What's needed, it continues, is "An innovative system of research in science and technology as we approach the 21st century . . . . If we are to fundamentally reform the existing technological system so that we may reduce energy consumption, alleviate global environmental burdens and improve technological reliability . . . scientists and technicians must observe various biological functions—those for metabolism, motility, and thinking—and utilize and apply them in new development."

The outline refers to "protein engineering, biodevices, artificial photo-synthesis, and educational computers capable of advanced syllogism," and notes that "work on technology to apply the functions of biological systems is still in its infancy. Basic research and development in this area is expected to take off on a full scale in the coming years."

As for organizational arrangements, the Japanese proposal says that "Themes for research and development will be determined by a Program Committee . . . comprised of prominent scholars and researchers, both Japanese and foreign." The program, it says, will fund R&D activities at Japanese and foreign research institutes, universities, and private organizations, and will support "expansion and improvement of research facilities for the smooth implementation of international collaborative research."

As for Japan's stated motive for financing research abroad and collaborating on this program with other nations, the reason offered is that "Progress in science and technology depends on an appropriate balance of competition and cooperation. But when dealing with developing technologies that will be applied to issues that affect the whole human race, international cooperation in fundamental programs like this is a necessity."

GAO Says Total Costs Are Masked in Particle Physics

A report critical of the budgeting of high-energy physics facilities has been issued by the General Accounting Office (GAO), but the main conclusion it supports is that Congress may be considerably denser than its numerous critics contend.

The report, requested by Senator J. Bennett Johnston (D-La.), charges that the Department of Energy has been giving the Congress only year-by-year costs for major accelerator facilities, rather than spelling out total expenditures in advance. Thus, the GAO says that while the proposed Superconducting Super Collider is projected to cost $4.1 billion over an 8-year period, the Department of Energy fiscal 1987 forecast has it budgeted for a mere $57.9 million. GAO concludes that DOE is not leveling with the Congress.

Another report requested by Johnston is more to the point but has been overtaken by events. Concerning the selection process for the Continuous Electron Beam Accelerator Facility, it concludes that the consortium that got the machine, the Southeastern Universities Research Association, "had neither an organization nor the technical expertise to build such a facility." But it's got it now, so the point is moot.

The reports, *Nuclear Science* (GAO/RCED-86-108) and *Nuclear Science* (GAO/RCED-86-79), are available without charge from GAO, PO Box 6015, Gaithersburg, Md. 20877; tel. 202/275-6241.

A Gentle Hearing for Academy of Sciences

A rare event in science and government relations, a Congressional look at the National Academy of Sciences (NAS), took place last week. But it turned out to be a drowsy affair, with the few members in attendance lobbing gentle questions at the NAS officers, who responded with self-congratulatory accounts of their overblown organization.

NAS President Frank Press retired the cup for institutional megalomania when he matter-of-factly concluded his testimony by stating: "I hope it is not immodest of me to assert that the National Research Council [working arm of the NAS] is perhaps the most powerful technical advisory apparatus available to any government in the world."

The recipient of this and similarly disinterested encomiums was the Science Policy Task Force of the House Science and Technology Committee, which is on the homestretch of a 2-year study of federal-science relations. Press was followed in the witness chair by Robert M. White, President of the National Academy of Engineering (NAE).

An NAS appendage which claims to honor the cream of American engineering, the NAE recently added Chrysler's Lee Iacocca to a membership roll heavy with corporate brass. White assured the Task Force—which at that point consisted solely of Chairman Don Fuqua (D-Fla.) staring at his dead cigar—that "The Academy complex is working well." Testimony was also presented by Samuel Thier, the newly installed President of the third wing of the NAS, the Institute of Medicine, but since the IOM is in a recuperative phase from near collapse, Thier mainly dealt with plans and hopes, rather than the past performance of the organization.

Keyworth Critical

The hearings on the National Academies, stretching over 3 days of 2-hour sessions, opened with testimony by George A. Keyworth II, who stepped down in January as White House Science Adviser to go into private consulting in Washington. Keyworth, whose arrival in the White House coincided with the beginning of Press's term as NAS President, said he didn't get much useful service out of the Academy when he asked it to provide advice on scientific priorities. "I needed to know 2 things," he testified. "What should be the priorities for support of research within a discipline and what should be the priorities for support within science and engineering?" Keyworth continued:

> In a few cases, we were able to get straightforward answers to the first question. The best example was always the Academy's astronomers, who periodically bit the bullet and published a rank-ordered list of facilities they believed should be funded. Next, but a long way down the list, were my fellow physicists, who, if locked in a room and deprived of food and drink, could sometimes agree on priorities for major new facilities. Most of the rest of the disciplines simply lacked the resolve or the pressure to say one part of their field was more important than another, so their "recommendation" usually was to provide increased funding across the board for their discipline. That wasn't going to happen, so why they thought it made more sense to leave those kinds of decisions to the Office of Management and Budget I'll never know, but in many cases that was the result of their reluctance.

Keyworth then turned to the issue of priorities among fields of science, saying, "I think we made good decisions about those relative priorities, but let me make it clear that we did so without any great help from the science establishment itself early in the '80s." The situation "has been slowly changing for the better," Keyworth added, "and here at least the Academies must be credited with recognizing the problem and responding to it." Keyworth credited the late George Low with improving the NAS-NAE performance.

Urges Policy Recommendations

In Keyworth's view, the greatest deficiency in the Academy's performance was in what he described as a reluctance to make policy recommendations. "Scientists can study problems to their hearts' content, waiting until the perfect solution appears and feeling that they've gone far enough by producing a recommendation that 'more study is needed,'" he said. "But there are many times when issues demand action, and it's the policy implementers, often people up here on the Hill, who can't take that refuge."

NAS President Press, in his testimony, expressed surprise at that observation by Keyworth. Press correctly noted that reports produced by the NAS often carry policy recommendations. What was left out was that not often are they heeded by the recipients of the advice.

The most accurate assessment of the Academy was provided by Denis J. Prager, who served in the White House Science Office when Press was Science Adviser to Jimmy Carter, and remained there for nearly a year in the succeeding Keyworth regime. Prager then worked at the Academy for 6 months before going to his present post, Senior Program Officer at the MacArthur Foundation. The NAS is indeed a useful and unique analytical institution, Prager said, but the organization is beset by many problems that cut into the quality and usefulness of its work.

The Academy is cumbersome and expensive, Prager said, and, echoing Keyworth, "final reports of Academy studies are often the result of a considerable amount

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Q&A: SDI's Ionson Scoffs at Star War Foes

Ill feelings have existed for some time between academic researchers opposed to the Strategic Defense Initiative and James A. Ionson, who, as Director of SDI's Office of Innovative Science and Technology, administers substantial sums for basic research—$28 million last year, $100 million this year, and perhaps $150 million next year. On the evening of April 30, Ionson failed to show up for a long-scheduled panel discussion which drew some 500 people at the spring meeting of the American Physical Society, in Washington. He says his office notified APS that he would be unable to participate because of other business; the chairman of the panel says his office confirmed that he would appear. In any case, that very afternoon, Ionson, 35, formerly an astrophysicist at NASA, was chatting with SGR Editor Greenberg. Following is the text, edited by SGR.

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***SGR.** There are a lot of academics out there, several thousand at last count, who say they won't touch your money. MIT, Illinois, and Cornell are homebase for many of them.*

Ionson. First of all, the people who are actively opposing accepting any money haven't been offered any money. They haven't been offered money for a couple of reasons. One is that the type of work they are working on really isn't appropriate. I mean, we don't need a new law of physics to make SDI work. We have to expand technology into unexplored areas, and that's much different than inventing a superstring theory.

It's of interest to note that we had to turn down more good proposals here than there were signatures on the petitions from physics departments. I should remind everyone that most of those signatures are from physics departments. And being a physicist myself, I know that the type of training that physicists get is not the type of training that is appropriate for this kind of work.

***SGR.** I'm surprised that you're not interested in having someone discover a new law of physics. Isn't that precisely what SDI would like to have someone discover?*

Ionson. No. It's new ways of utilizing and manipulating the laws of physics that exist today. It's a high-technology program. And by and large, the types of people involved with this program are engineers, high-technologist engineers, or applied scientists. SDI is an engineering program that employs frontier applications and extensions of science. What I did in my own research [in astrophysics] was science. I tried to understand the basic laws of physics which the sun used in making a solar flare. That is radically different from the type of work that an engineer does in taking the laws of physics and manipulating them in a very clever way to make an electro-magnetic rail launcher do its thing. So, engineers apply the laws of science for the human race, whereas scientists unravel what those laws are, and in many cases, how nature utilizes those laws. It's a dramatically different profession. And there are many more engineers in this world than there are physicists.

I love physics—don't get me wrong. But, speaking as a physicist, I have to say that my courses in thermodynamics and my courses in electrodynamic theory and in quantum statistics—I haven't used them at all here. What I've used here are my courses in engineering. And the reason I'm here is that I have politically a very strong view toward this program. I believe in it strongly.

***SGR.** You're saying that the petitioners come from backgrounds that quite likely aren't suitable for the sort of work you want to do.*

Ionson. That's right. My view is that, just as one of the reasons I'm involved with the program is that I impedance match with the ideologies of the President, they may not match with the ideologies.

***SGR.** But surely among the many who have signed the petitions, there must be some people who have scientific or engineering talents that would be useful for SDI.*

Ionson. I think only a couple. Just a couple. It would be interesting to do a survey of those who have signed the petition and find out how many are faculty, how many are students, how many are wives of faculty.

***SGR.** I gather you harbor serious doubts that these are*

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Academy *(continued from page 4)*

of compromise among strongly differing views. This process of consensus building and compromise often results in a report deemed less than ideal to policymakers faced with discrete public policy decisions. In addition, that process often weakens the report to the point where its overall quality and usefulness are suspect."

Noting the organization's heavy dependence on federal funds—86 percent of its $99-million budget this year comes from federal agencies—Prager said he was "concerned about the tendency over the last several years for the 3 Academies to become 'job shops' competing with all the other contract research organizations in Washington for Federal agency dollars for specific policy studies . . . . It is difficult to be totally objective and unbiased," Prager said, "when the source on which you are completely dependent for your survival strongly prefers a study outcome consistent with the stand it has already taken. That is, one tends not to bite the hand from which it feeds."

Congress, he said, should consider a one-time appropriation to the Academies for "an endowment adequate to assure their independence and autonomy." In response to a question, he estimated that a $100-million endowment would provide the Academy with ample independence.—DSG

. . . Peer Review Valued, But Can Be Reversed

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the kind of people you would want to enlist anyway.

Ionson. First of all, we're not out there to enlist anyone. If they were not interested in participating, then, of course, they don't have to. But my view is that the reason they are making this explicit is that it's a political statement. Many of them acknowledge that it is a political statement. Which is fine—it's within their right. But then, the American people have also made a political statement by electing a Congress which has strongly supported this program. There's conservation of opposition. As the number of opponents decreases, their volume tends to get louder.

Risky Programs

SGR. *Your programs are supposed to be risky, aren't they?*

Ionson. The philosophy is that if we are *sure* that a particular piece of research has some merit and it's basic—then, quite frankly, that's why we have a National Science Foundation and other basic-research arms. They invest in almost surefire things. It's the poor guy or gal out in the street who has a concept which is perceived by the scientific or the engineering community as not being viable, but yet it may be. They're on the short end of the stick, and we give that group, or that person, a chance. In many cases—certainly in some cases—it pans out.

SGR. *Would you go as far as the perpetual-motion machine?*

Ionson. No, no, of course not.

SGR. *Then, there has to be some scientific credibility, but it has to be risky—is that it?*

Ionson. A good example of a risky effort is perhaps the gamma-ray laser. Gamma-ray lasers do not exist now. Yet, we and the Soviets and the world have been trying to invent one for well over a decade.

SGR. *Why do you want one?*

Ionson. Well, a gamma-ray laser has a lot of applications. A laser is much like a scalpel. The sharpness of that scalpel corresponds to the wavelength of a light. If you have a gamma-ray laser, which is a very short wavelength, indeed, you can use that scalpel to diagnose the structure of nuclear material. For strategic defense, it would be a good diagnostic tool for looking at warheads. For decoy discrimination, it would be extremely useful, and it would also be useful in destroying the warheads.

SGR. *Who are the researchers doing this work, and how did you team up with them?*

Ionson. There was a very large, relatively diffuse effort going on in this country. We held a symposium, drawing together all of the rivals and competitors, the adversaries and friends of this particular effort. Basically, we said, "Get together. If you get together and work coherently, then we'll invest in this program. If you continue going down many rival paths and retracing old ground and rewalking down old roads—no, we're not interested. Take some chances, try a new route, and we'll support you in this."

SGR. *How much support are you giving them?*

Ionson. In '86, I think, it will be $3 million. It's for a bunch of universities, the national labs will play a role—Los Alamos. The universities now include the University of Texas, in Dallas. And we're close to awarding contracts for another half-dozen or so.

SGR. *Can you decide that professor so and so is going to get some money to do this or that?*

Ionson. A peer-review process provides a recommendation to this office on what types of efforts should be funded. That's from the peers, from the outside community. We also get recommendations from the government scientists on what types of things should be funded. We decide here, based upon those inputs, what will ultimately be funded.

Role of Peer Review

SGR. *Do you ever override your peer reviewers' judgments?*

Ionson. Yes. Now I have to qualify that. When the peers come in and say, for example, "This should not be funded, because we don't understand it, it's not clear if it will be successful. We recommend you fund groups and efforts that have a long history of success." If that comes in, coupled with another review—say from our own government scientists—that "there may be something to this particular approach, we're not sure if it's right, you may or may not want to take a chance." Quite often, we'll take the chance here.

SGR. *Is the discretion with you?*

Ionson. The discretion is here.

SGR. *Have there been instances in which you override the peers?*

Ionson. In a few cases, yes. There's one particular case in which—I can't disclose, but I can still give you the example—the peer-review board came in and did, in fact, say we don't recommend any support for this approach at all. I'll read it to you, because it typifies a problem. It says here: "On the positive side, it was stated that the principal uses in this proposal have a firm basis in the X regime or the Y regime. However, here it is unclear that the approach is being properly addressed in the Y regime." *Unclear.*

"It is also not clear that the side bands and the experi-

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. . . Unpredictability as a Bureaucratic Tool

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mental results are correctly explained or that they are relevant. Given the lack of clarity and relevance, the panel members reached a consensus that the proposal should receive no support at all." Wrong. I supported this one, for half of what the person asked for. He was asking in the neighborhood of $1 million. This was a university researcher.

SGR. *And you gave him about half a million, over the advice of the peer reviewers.*

Ionson. Yes. What concerned me in this one special case was the problem that the words used were subjective words—unclear, not clear, clarity—and not words of the absolute. The whole point of research is to clarify and to make it clear. In fact, it's this particular review which made it clear to me that it should be funded.

Helping Academic Science

SGR. *What are you proudest of having achieved in the 2 years you've been at this?*

Ionson. I think getting this gamma-ray laser program together, and really stimulating that whole community, is something we're excited about. We've done the same thing in the area of optical computing. There's a whole cadre of "little science" that's being done, little breakthroughs, little advances, ranging from capacitor development to micro-miniature refrigerators.

There was a recent article by Frank Press, President of the National Academy of Sciences (*Science,* March 21, 1986), which suggested that it might be a good idea that the [federal government's] applied-research arms shave off 1 or 2 percent and put it into small science. That's precisely what we've done here. I'm particularly proud about that. This is $100 million in '86 and over the time frame of the SDI, half to three-quarters of a billion dollars that will be available to the basic-research community, and it would not have been available otherwise.

SGR. *In this big and complicated government, you run a small office with an ample budget. There must be a lot of bureaucratic tensions and roadblocks and mazes that you have to navigate around.*

Ionson. Well, you have to be relatively unpredictable. In order for somebody to get in your way, they have to know where you're going, a lot of times. And, sometimes in this office we may appear to be unpredictable, but that's to stay out of the way of certain bureaucracies. You have to be quick on your feet.

SGR. *How do you keep it unpredictable?*

Ionson. That's the nature of the leadership in the office. Again, not unpredictable in the sense of where the science or the technology is going, but in the day-to-day business dealings with bureaucracies. Bureaucracies have a tendency—if you let them know where you're going, they can set up a number of roadblocks.

SGR. *Can you give me an example of this over the past 2 years?*

Ionson. I think perhaps just getting this office started. I'm pretty sure that if we had announced to the world that there would be another fundamental research arm within the government, that the existing research arms might stand up in rebellion . . .

SGR. *DOE and NSF?*

Ionson. Whatever—they exist . . . and say,"Hey, no, we can do this. Since we're established, we can do it better." So, rather than announce our intent to do this, we just did it. We were able to move real fast and slip through the cracks and no one knew what happened. The next thing they knew, there was a substantial program running and going. I think it took a lot of people by surprise.

SGR. *You've been reaching universities that, by and large, have been neglected in the past by NSF and DOE. You're not often dealing with the top 20. Is that deliberate?*

Ionson. None of us [in Ionson's office] was ever affiliated with a funding institution. We never gave money away before, so we really entered this very objectively. We don't care if the researcher comes from university X or Y. What counts is the work coming out of that individual. Having been involved a great deal in writing my own [research] proposals, what you will find in many cases is that a peer reviewer, rather than looking at the investigator, will look at the institution.

Research Abroad

SGR. *You're establishing programs with researchers abroad—some in the UK. Why, when American scientists are clamoring for money?*

Ionson. We support science and engineering, whether it comes from overseas or in this country. There have been some very interesting ideas and concepts that have come in from overseas in the area of optical computing and optical devices, among other things, that really were not being pursued to the degree here that they were overseas. We made a technical selection and funded them.

SGR. *How much money are you providing for people abroad now?*

Ionson. Right now, for '85-'86 it's under $1 million. It's relatively small moneywise, but the information those researchers can get from us by participating is worth—they're buying into a program of hundreds of millions of dollars. I'm not referring to my program here, but just the SDI technology itself.

If the Bottom Dropped Out of Federal R&D

The following is from prepared testimony by Harvey Brooks, Professor of Technology and Public Policy, Kennedy School of Government, Harvard, to the Science Policy Task Force, House Science and Technology Committee, at a hearing April 13 on federal funding of research.

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We know that most of the seminal advances in science result from the work of a small proportion of scientists . . . . The same applies in somewhat lesser measure to institutions. One could draw two policy conclusions from the above observations. One is that we could possibly absorb a major reduction in science funding without a proportionate loss of scientific productivity if we had the political skill and will to be sufficiently selective about the individuals and institutions we continue to support.

I am doubtful, however, that that would be possible within the American political system. Our system aims at a combination of fairness (equality of opportunity) and efficiency . . . . The tradeoff between fairness and efficiency becomes easier to make when resources are rising, while the 2 objectives tend to be more in conflict when they are falling. If we gave priority to fairness and equality of access in a period of shrinking resources, I believe the result would be catastrophic not only to science, but also, with some time lag, to our economy and security as well . . . .

If government were to reduce its role in the support of basic and academic science, it does not appear likely that any other institution or funding source would step in to fill the gap. Corporate funding of academic science, now about 6 percent of all academic R&D, is not likely to more than double at best, and would tend to be concentrated in a few fields of self-evident industrial relevance . . . .

If the problem of triage were left to the organized management of the scientific community itself, the first result would be chaotic, but in the end, the scientific community would choose efficiency over equity, and the least harm would be done to scientific productivity. But the result would be the least politically palatable to the members of Congress and the people that elect them. The money would be distributed in what would be viewed as a highly elitist manner, and within a short time I believe the process of redistribution would become politically unsustainable. Equity and fairness would win out over efficiency, and the productivity of the system would collapse . . . .

[I]t may be a mistake that we have become so exclusively dependent on the peer-reviewed competitive project grant mechanism for the support of academic research. This does not mean we should throw it out . . . . But we should restore some pluralism in the *mechanisms* of support—a pluralism that existed in the 1960s, but which has largely been squeezed out in the last 20 years . . . . When cutbacks are necessary, institutions with support coming in large programmatic blocks may be in a better position to control their own priorities and rebalance their programs according to the resources available than institutions such as universities that are dependent on dispersed sponsorship from many sources . . . .

When a research institution hires a scientist, it budgets for his or her total support; when a research university hires a scientist, the most it can hope to do is to provide him or her with a "hunting" license to compete for support from an external sponsor . . . . In my opinion, a strong case can be made that a few select individuals of proven scientific creativity may be in a better position to assess priorities among fields of science and to chart the general directions of their research than any group of peers operating at arm's length; this argues for providing at least some support directly to a small minority of scientists on the basis of past performance rather than on the basis of what they promise to do 18 months from now.

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